See p. 10.

NOTES

ON

TINEA IMBRICATA.

BY

PATRICK MANSON, M.D.

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PLATE I, (page 2).

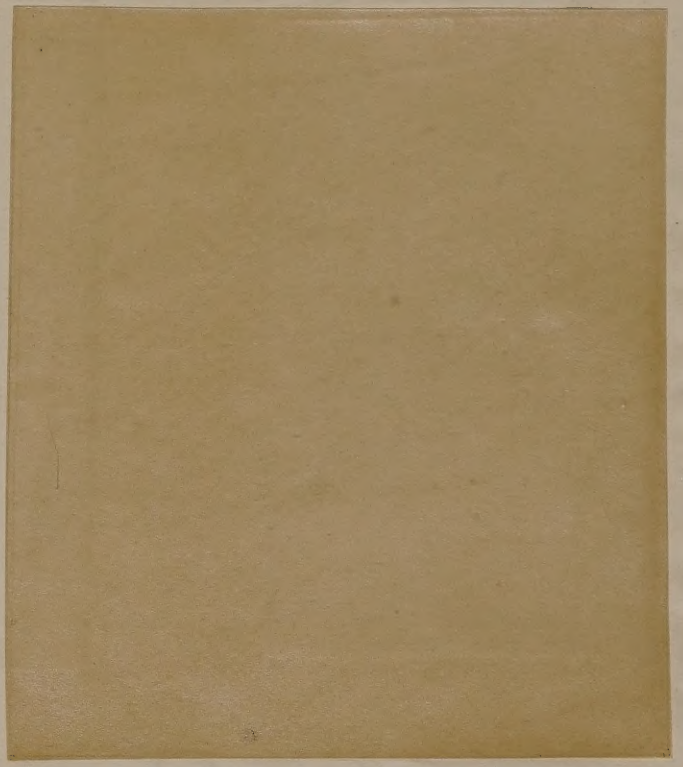


PLATE II, (page 2).

PLATE III, (page 7).

PLATE IV, (page 3).

PLATE V, (page 6).

NOTES on TINEA IMBRICATA, an Undescribed Species of BODY RINGWORM.

By Patrick Manson, M.D.

Dermatologists pretty well agree in their descriptions of the various forms of epiphytic skin disease, and in the characters of the vegetable parasites with which they are associated. Favus, tinea tonsurans, tinea sycosis, tinea decalvans, chloasma, are distinct diseases, and are generally recognized as such. This unanimity, however, does not obtain in the case of tinea circinata, or ringworm of the body, some authorities teaching that there are several species of tinea included under this name, while others affirm that there is but one disease, and one species of fungus producing the different modifications. Dr. Tilbury Fox is one of the most recent writers advocating this latter view. In his work on skin diseases he is very decided in his assertions. He says, referring to this subject, "It will be seen that I include a number of diseases hitherto regarded as distinct from tinea circinata under that head. Of the correctness of this step, I have no shadow of doubt, and it really saves a vast addition to the vocabulary of the dermatologist." Under one head he brings, besides the typical form of tinea circinata, all what he calls its uncommon phases, "such as general parasitic tinea, parasitic eczema, Burmese ringworm, eczema marginatum, Malabar itch, Chinese itch, etc.," and these varieties of the disease he attributes to the influence of diversity of climate, clothing, constitution, and part of the body affected.

While agreeing with Dr. Tilbury Fox in the desirability of simplifying so complicated a subject, with all deference to his high authority, I take the liberty of asserting that his generalisation is too sweeping, and that there are at least two distinct and well-marked species of body ringworm. I agree with him thus far in considering that the names he enumerates do not *always*, or generally, represent different species of disease; but when he maintains that there is only one species, he goes too far, and, I believe, is mistaken. It seems strange that one so practised in observation should fall into this error. I can only account for it by supposing that he and those whose opinions he represents have never seen a case of the disease I propose to describe under the name of tinea imbricata, and that a careful description of its characteristics is not to be found in medical literature. In the following remarks I will endeavour, by a detailed account of a case of tinea imbricata and another of tinea circinata, to supply this description, and bring out the characteristics of the two diseases by their contrast; and afterwards I hope to show by a description of the microscopic appearances of their respective fungi, and the results of experiments in inoculation, that the difference is not only in clinical characters brought about by peculiarities of circumstance, but actually in species, and is everywhere and in all circumstances constantly maintained.

Details of a Case of Tinea Imbricata and of a Case of Tinea Circinata.

Case 1. *Tinea Imbricata.*—(Plate I.) Liam, male, æt. 45; a rice grinder; native of and resident in Amoy. He is well nourished, muscular, and in excellent general health. Twenty years ago he emigrated to the Straits Settlements, where he worked in a sago factory, but returned to Amoy after an absence of only three years. He came back in consequence of the eruption of the skin disease he now suffers from, his friends having told him it would disappear in the cooler and drier climate of China. He was in the Straits but a few weeks when the inner surface of his right thigh was attacked by the disease, which, in the course of three years and a half, spread over nearly the whole of his body. At the sago factory there was a Cantonese who had the disease. This man's towel he used to wipe his body with, and to this circumstance he attributes his infection. There has been no remission all these twenty years; his skin has all along had the same appearance. During the winter, perhaps, the itching which troubles him so much in warm, damp weather, is mitigated.

The extent of the disease is most easily described by enumerating the parts not involved. These are:—1°, a symmetrical patch of sound skin, extending in front from over trochanter major to trochanter major; on an average this patch is about four inches broad; in the middle of the body it expands slightly and includes the genitals. 2°, an oval patch in the middle line over the lower lumbar vertebræ; it is about the shape and size of the palm of the hand, its long diameter lying vertically. 3°, a symmetrical patch in front of the chest, including both nipples and stretching from armpit to armpit, the skin of the walls of which, both brachial and thoracic, is quite healthy. This patch measures over the sternum about six inches in breadth. 4°, the whole of the hairy scalp, with the exception of that over the occiput, the disease on which is continuous with that of the neck. These four patches of sound skin are shaped and arranged symmetrically; but, 5°, a long irregular surface on the front of the left leg has nothing corresponding to it on the right side. With the exception of the parts enumerated, the whole of the rest of the skin is implicated.

It would be difficult to give a description applicable to the disease as it is seen in all parts of the body, but if I select one spot, as that represented in Plate II, some idea of what I might call the plan of the disease may be conveyed. The patch selected is situated just above the right nipple. A rectangular portion, measuring $3\frac{1}{4} \times 4$ inches, has been marked off with ink. On the surface of this the epidermis is arranged in a series of wavy lines, lying parallel to each other, and having a more or less concentric arrangement in relation to an imaginary point, situated somewhere about the tip of the right shoulder. It is very like the ringed appearance in a cross-cut log of wood. On closer examination, this effect is found to be produced by an undermining of the epidermis, giving rise to long flakes, about $\frac{1}{8}$ of an inch in breadth, the free edge of the scale being directed towards the centre of the circle, the convexity remaining still firmly attached. If the hand is passed over the surface from the circumference towards the centre of the circles, the scales are smoothed down; if in the reverse direction, they are raised up, and stand out prominently, defining the wavy outline of the rings very distinctly. If we attempt to detach the scale, it is found to be firmly adherent at the outer edge; but by using a little force it can be peeled off, the flake becoming thinner, softer and more delicate the further we proceed from its original attachment, until it is completely separated. If the forceps is carefully used, two or more inches in length of epidermis can thus in some places be separated in a continuous, unbroken ribbon. Just under the free edge of the scale, the skin is lighter in colour than between it and the preceding or succeeding rings. The rings are about $\frac{1}{8}$ to $\frac{1}{4}$ of an inch apart, so that thirty can be counted between one corner of the square and the other. Some are quite regular in their outline over a length of five or six inches, others, again, are interrupted at intervals and more or less irregularly convoluted; but there is no spot an inch square within the area of the disease unoccupied by these scaly rings.

On the soft and protected skin of the thorax and abdomen, the disease and its characteristic features are seen in their greatest perfection. On the back and shoulders, the flakes of loosened epidermis, being seldom disturbed by scratching or friction, have acquired greater dimensions, but from their size and the

irregular way in which they have been shed, they more or less conceal the ringed pattern so evident in front. The arms and legs, feet, hands and face, being subject to much friction, have assumed a rough, reddish, furfuraceous appearance, with the wavy outline of the rings only visible in places. The hair of the eyebrows and occiput seems quite healthy, growing strong and glossy through the diseased epidermis. Though rough to the touch from the desquamation, there seems to be no thickening or effusion into the corium, notwithstanding the length of time the parts have been affected.

In this case, as observed at present, the line of demarcation between the perfectly sound and the diseased skin is not very abruptly marked. It looks as if the disease endeavoured at times to push on to and establish itself in the sound skin, but finding the ground unsuitable, released its hold, leaving little outposts of spots and lines at intervals along the ground it has been compelled to abandon.

Over the abdomen, the rings have advanced from right to left, the free borders of the scales being directed to the right; over the thorax on both sides, diagonally from above downwards and without inwards; over the back from a point between the shoulder-blades.

Another point deserving of particular notice is the existence of symmetrically arranged patches of leucoderma on which there is no scaling or rings. Such patches are to be seen on the anterior surfaces of the wrists and forearms; and still more markedly on the upper anterior and inner surfaces of the thighs. The disease has been in existence longest in these localities. In the leucodermic patches, the loss of colour, though extending over a considerable area, is not in one large continuous patch; but white spots an inch or more in diameter, are mixed with spots of the natural colour of the skin, giving the places mentioned a piebald appearnce.

During all the years this man has lived in Amoy, he is not aware of having communicated his disease to any one.

Case 2. *Tinea Circinata.*—(Plate IV.) Tchok, male, æt. 19; came to hospital suffering from general debility and ringworm.

The characters of tinea circinata are well known. A minute description of them is therefore unnecessary. In giving this case I will merely mention the principal and diagnostic features, to insure its being recognized as the disease in question.

On his face, and nowhere else, is a well-marked ringworm. It has been out for one month only, and spread from a spot on the right side of the nose. The ring is incomplete on the right cheek, and is broken in several other places, once by the right eye, again by the mouth, and again by the left ala nasi. On an average, it is about $\frac{1}{4}$ of an inch in breadth; it is slightly but distinctly elevated, of a dark red colour, scurfy and obscurely vesiculated at places, and is very itchy. The margin is more abrupt at the spreading, shading off at the receding edge; and though there is a tendency at the convex border to undermining of the epidermis, the scales so produced are very minute, not in any place measuring more than $\frac{1}{8} \times \frac{1}{32}$ of an inch. There is no attempt whatever at reproduction of a ring in the skin already travelled over, which is quite natural in colour and texture. Under the microscope, mycelium and spores of trichophyton are to be detected in scrapings from the ring.

Trichophyton Tonsurans and the Fungus of Tinea Imbricata.

The microscopic appearances of the fungus of tinea imbricata, although in many respects closely resembling those of the fungus of tinea circinata (trichophyton tonsurans), are yet sufficiently distinctive to render the diagnosis of the disease by the microscope alone quite a simple affair. In the first place, it is often no easy matter to find fungus elements in tinea circinata, and several slides may have to be examined before a fragment of mycelium, not to mention a chain of conidia, is found. But in the case of tinea imbricata, one has only to raise any scale on the diseased surface, and place it under the microscope, to see fungus elements in enormous

abundance. In every field are hundreds of conidia, arranged in chains, crossing and re-crossing each other, and mixed with a fair proportion of mycelia; and with a little alteration of the focus one can see that there is not one, but several layers of this elaborate network. This contrast in the quantity of fungus in any given specimen is most remarkable. (*See* FIG. I.)

Another point of contrast is in the position the fungus occupies in the skin. There can be no doubt about this in tinea imbricata; it is always in the lowest layers of the scale of epidermis. From the size of the scale, which can be raised and laid on the slide smoothly and accurately, this is easily determined. In the case of the fungus of tinea circinata, we cannot be so certain from microscopic evidence alone of its position; but the mycelial threads seem to spring from deep in the skin, and wind in and out amongst the superjacent layers of epidermis. The seat of tinea imbricata is undoubtedly in the non-vascular rete Malpighii, or deeper layers of the epidermis; of tinea circinata, probably in or on the surface of the vascular corium and its hair follicles; hence the small amount of irritation and inflammatory change excited by the former, and the thickening, induration and red raised ring of the latter.

Additional proof that the rete Malpighii supplies the pabulum on which the fungus of tinea imbricata lives, is afforded by the absence of colour in the skin just travelled over by the rings of advancing disease, and by the frequent occurrence of leucodermic patches in those parts which have been longest affected, and the subsidence of the disease where the skin fails to reproduce its pigment layer.

FUNGUS OF TINEA IMBRICATA (FIGS. I, II, III).

Conidia,—generally oval, rarely circular, often irregular, measuring from $\frac{1}{10000}$ to $\frac{1}{5000}$ of an inch in diameter, arranged in single rows, or long often-branching chains. They appear to be formed in two ways, either by division of previously existing conidia, or by segmentation of mycelium. Where the latter has recently been effected, the conidia are more rectangular, of a darker colour, and often contain reddish-brown granules; otherwise the conidia are colourless, without markedly granular contents, and of a rounded contour. If a chain of conidia is traced to its termination, this is usually found to consist of a longer and larger spore, in some instances exhibiting a transverse constriction, as if dividing. In an ordinary specimen, these chains of conidia are much more numerous than the accompanying mycelial threads.

Mycelium varies in breadth from a very minute thread up to $\frac{1}{5000}$ of an inch. It appears to be of two sorts, a paler and a darker, though intermediate forms can usually be found also. The paler variety is less sharp in outline, and from its rounded appearance resembles more than does the other the structure of the perfect conidia; it branches frequently, is interrupted irregularly by articulations and delicate transverse septa, and frequently terminates or arises in a chain of conidia. The darker variety is more tape-like in its appearance, and is recognized by its delicate but sharply defined border, and the numerous granules of dark reddish-brown material it contains. This latter form is also frequently branched, and little protuberances are attached to it at intervals; it is much articulated in places, and terminates in a bulbous extremity or in a chain of conidia. The colour granules tend to run together when the specimen has been immersed some time in dilute liquor potassæ. Both forms of mycelium vary much in diameter, and the threads are but slightly bulged, and only at long intervals.

Stroma.—This I have not recognized with certainty in recent preparations; but if the scales are kept for several weeks in a dry bottle, and then examined, it will be found that the conidia have nearly entirely disappeared, their place being taken by large articulating, much-branched mycelial threads (*see* FIG. II), and patches of what I believe to be stroma. This latter is made up of innumerable exceedingly minute globular cells, heaped together without any definite arrangement.

As in all cases of epiphytic skin disease, bacteria, micrococci and similar low forms of life abound in and about the epithelial scales.

FUNGUS OF TINEA CIRCINATA (TRICHOPHYTON TONSURANS).

(*See* FIGS. IV and VI.)

Conidia.—In proportion to mycelium, and compared to tinea imbricata very few indeed, many scrapings having to be searched before they are found. In size they are much the same as those of tinea imbricata, but are more globular in form, and are often compressed in the direction of the axis of the short chain in which they are generally arranged. The terminal conidium is large and bulbous and more oval. They are generally seen to be connected with mycelium.

Mycelium varies in breadth, as does that of tinea imbricata, but it is distinguishable from the latter by numerous swellings and constrictions and other irregularities in outline. This contrast is very noticeable. It is frequently articulated to form conidia, and septa and branches are common. Generally the threads contain very minute dark granules. The course of a mycelial thread of tinea imbricata is usually long, straight or gently curved; that of the mycelia of tinea circinata is generally short, irregular and much convoluted.

Stroma, I have not detected with certainty.

EXPERIMENTS IN INOCULATION.

The contrast in the clinical features of these two diseases, and the microscopic characters of their fungi, is decided. If I now show, by careful observation of the results of their successful inoculation, that these distinctive features are transmitted and maintained in every instance and in the same individual, the assumption of Dr. Tilbury FOX and others, that the disparity in the appearance of the varieties of ringworm is produced by differences in climate and other circumstances, will not apply.

INOCULATION OF TINEA CIRCINATA.

Inoculated two assistants by scratching the epidermis on anterior surface of forearm, and rubbing into the spot scrapings from the ring of TCHOK, Case 2. The inoculated spot was protected by a pledget of cotton wool held in place by strapping. The following are my notes, made every few days during the progress of the inoculation:—

5th day.—Dressings removed. One case has completely failed; but on the forearm of the other, close to, but not quite over, the seat of inoculation, is a very minute vesicle.

8th day.—A red, itching spot, slightly, if at all, elevated, about $\frac{3}{16}$ of an inch in diameter, where the vesicle was.

10th day.—Yesterday, the original inoculation spot became itchy and red, and to-day is larger and more itchy. The other spot, where the vesicle was, has not extended.

15th day.—The site of the inoculation is now occupied by a circular patch, $\frac{7}{16}$ of an inch in diameter. It is red, rough, slightly elevated and itchy, and is beginning to assume the appearance of a ring, the centre being paler than the circumference, and distinctly depressed. The site of the vesicle is now included by the ring.

17th day.—The ring, gradually enlarging, is now over $\frac{5}{8}$ of an inch in diameter, perfectly circular, abrupt towards sound skin, shading off towards centre, elevated, very itchy, with one or two minute vesicles on it. Trichophyton easily found in scrapings.

19th day.—Ring is now $\frac{3}{4}$ of an inch in diameter, $\frac{1}{8}$ of an inch in breadth, with a bright red, slightly furfuraceous surface; no large scales.

22nd day.—Ring is now $\frac{13}{16}$ of an inch in diameter, rather more scurfy and less elevated; the minute furfuraceous scales are attached at the outer border of the ring; loose on the inner.

24th day.—Ring nearly $\frac{15}{16}$ of an inch. Skin in the centre appears to be quite healthy.

26th day.—Diameter about one inch. Outline more irregular. (*See* PLATE V.)

28th day.—Ring is now oblong, irregular and faded-looking; greatest diameter measures $1\frac{1}{8}$ inch.

33rd day.—Ring measures $1\frac{3}{8}$ inch, but is now not complete, being interrupted in several places. Outline also is more or less irregular in shape and colour. In places there are bright red spots, in other places paler spots; and some of these are in advance of the general body of the disease. Centre is quite healthy. The disease was to-day destroyed by the application of iodine liniment.

During the progress of the inoculation, the fungus was looked for from time to time, and always found. Its characters were those of trichophyton tonsurans, already described, and corresponded, as did all the other features of the inoculated disease, with those of the ringworm from which it was derived.

INOCULATION OF TINEA IMBRICATA.

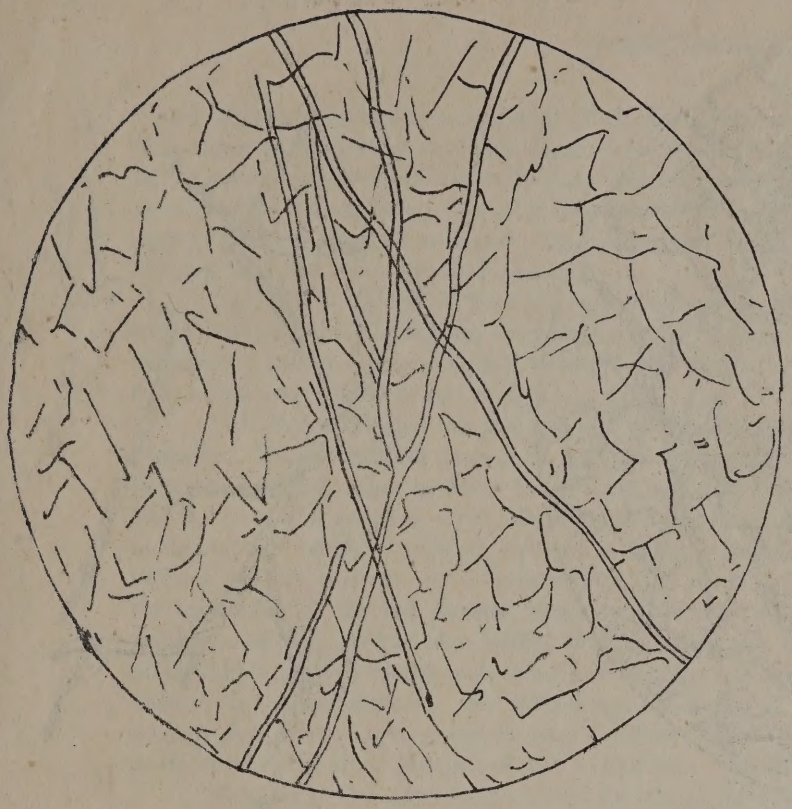
I was anxious to make a successful inoculation of tinea imbricata in the same individual, and accordingly, as soon as I was convinced that the inoculation of tinea circinata had held, I inoculated his other arm with scales from a case of tinea imbricata. These scales were quite two months old, having been kept in a stoppered bottle all the time. There was no result. I then sent for the man LIAM, Case 1, and, with fresh scales procured from him inoculated the left forearm in two places, front and back, treating the spots in exactly the same manner as I had done when on the same man I inoculated tinea circinata.

6th day.—Dressings removed. At the seat of inoculation the epidermis has been shed, leaving a very fair ring of undermined epithelium surrounding the spot, which is about $\frac{1}{4}$ of an inch in diameter; it is not elevated or altered in colour, though rather more glossy than the surrounding skin. Fungus was searched for, but was not found. The shedding of the epidermis I look upon as the result of the irritation, and in no way the consequence of the fungus.

8th day.—Appearance much the same as two days ago, though, possibly, more distinct. No trace of fungus in scales, and no itching.

10th day.—The circle of desquamating delicate epithelium has disappeared, but now there is a minute brownish spot on each seat of inoculation, that on the back of the arm being double. These spots are about $\frac{3}{16}$ of an inch in diameter, and do not itch.

12th day.—The brown spot on the anterior surface of the arm is slightly larger; it is not at all inflamed or very distinctly elevated, and does not itch. The epidermis covering it is very delicate, and a



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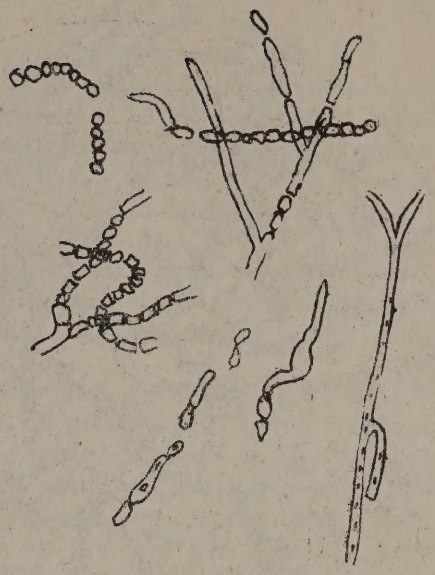

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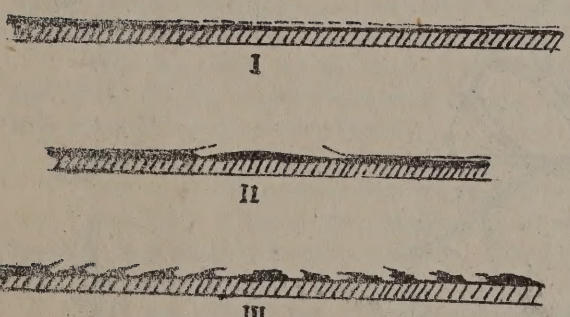

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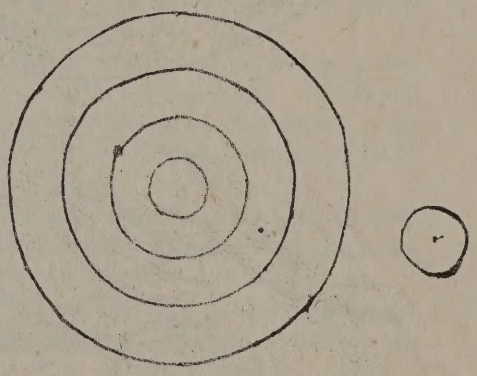

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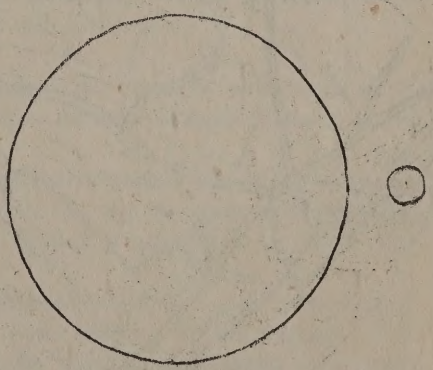

VIII

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III

considerable flake of this is easily peeled off by piercing it, and running a needle between it and the corium. Transferred to the microscope, this is found to be crowded with mycelium and innumerable chains of conidia of the same character as found in the case of tinea imbricata already described; the mycelium is perhaps more plentiful and made up of shorter lengths, and in many of the threads are large quantities of brown pigment granules arranged as nuclei. The spot on the back of the arm he has scratched; it is red, denuded of epithelium, and crusted in consequence.

13th day.—The spot in front is now $\frac{1}{4}$ of an inch in diameter, of a brownish colour, hardly elevated, and is surrounded by a delicate overhanging fringe of detaching epidermis. That on back of arm still damaged by the scratching; one half is occupied by a small crust, the other half resembles the spot on the front of the arm. It is red and swollen.

17th day.—The spot has now assumed a distinctly ringed appearance, and measures $\frac{3}{8}$ of an inch in diameter. He says it itches more than does the tinea circinata on the other arm, and has in consequence been scratched and rather spoiled. In tinea circinata, the surface of the ring is convex; in this it is ridged like the crest of a breaking wave. I believe this degree of elevation is, partly at least, attributable to the scratching. If carefully analysed, the spot is found to be made up of a series of concentric rings. From without, inwards, they are—1°, a brownish-red ring, about $\frac{1}{16}$ of an inch in breadth, lying apparently under the epidermis; 2°, the red elevated ring, from the ridge of which a complete circle of delicate, detached epithelium springs, its free edge looking inwards; 3°, a pale ring, with a glossy surface, surrounding 4°, a central brown, slightly raised spot, about $\frac{1}{8}$ of an inch in diameter. Ring on the back of the arm is not so distinct, and is not elevated. No redness nor thickening of the skin; but there is a slight deepening of colour at the outer margin, a distinct ring of delicate scales, a paler circle, and a darker spot inside, just as on the front of the arm; diameter of spot $\frac{3}{8}$ of an inch. Fungus in both plentiful.

18th day.—The spot in front is slightly larger, and a second ring of undermined and scaling epidermis is forming in the centre of the first; this second ring is $\frac{3}{16}$ of an inch in diameter. The brown central spot visible yesterday has disappeared, and the surface it occupied is now paler than normal. The patch on the back of the arm is also larger, but as yet there is no second ring forming, the central brown spot being still very distinct.

19th day.—Spot on anterior surface:—outer ring over $\frac{1}{2}$ an inch in diameter, inner ring $\frac{1}{4}$ of an inch. Spot on posterior surface:—$\frac{9}{16}$ of an inch in diameter, without a central second ring, but the included space is frayed, and looks as if it had been well scratched. He says the itching is now much less troublesome.

24th day.—Ring in front nearly $\frac{3}{4}$ of an inch in diameter. A third ring is now forming. On the back of the arm the eruption is more irregular. A third spot on the same arm, the result of another and later inoculation, is proceeding typically.

26th day.—Plate III, representing the disease on the anterior surface of the arm, was taken.

27th day.—The patch in front is now $\frac{9}{16}$ of an inch in diameter, and a third ring has formed.

29th day.—A fourth ring has formed on both spots. No thickening or signs of inflammation. Scales are kept small by frequent washings. Ring in front nearly an inch in diameter.

31st day.—Four rings distinct and perfect.

36th day.—Five rings. There is now considerable irritation, especially about the outer rings, and a tendency to inflame and vesiculate; the circles are in consequence not so perfect. Greatest diameter nearly $1\frac{1}{4}$ inch.

41st day.—The weather has become very hot, and probably in consequence, the irritation in the spots has increased. The inner rings have been spoiled by scratching, but the two outer rings are quite distinct, though slightly inflamed. Diameter, $1\frac{3}{8}$ inch. The spot on front of arm protected by a cover, the other spots destroyed with iodine liniment.

Several days afterwards, when the covering was removed, the patch was found much inflamed; the rings could be traced, but the fungus apparently had died, as the disease made no further progress. The roughness and scaliness of the epidermis gradually subsided, and the part became natural in texture,

though from the slight alteration in the colouring of the skin, the site of the rings could be traced for weeks afterwards.

These experiments were repeated in two other cases with similar results.

I am indebted to Mr. E. Rocher, of the Customs Service, for the photographs illustrating this paper.

From this description of a successful inoculation, the nature and distinctive characters of tinea imbricata can easily be made out. After inoculation, as in tinea circinata, there is an incubation period of about nine days. At the end of this time the fungus has multiplied sufficiently to slightly elevate the epidermis under which it is growing, and form a brown mass between it and the corium. When this has attained a diameter of about $\frac{3}{8}$ of an inch, the epidermis in the centre gives way; but as it is still organically continuous with the sound skin at its margin, it is not completely shed, but remains a fringe round the central hole. By friction or other means, the free edge of the scale is from time to time removed; and the brown central fungus and the tissues it is mixed with, now no longer protected by a closely adhering epidermis, are rubbed off as far as the attachment of the scale, and the exposed corium appears pale. Just beyond this point, the advancing fungus shows through the epidermis as a brown rim, perhaps very slightly elevated, about $\frac{1}{16}$ of an inch in breadth. When the entire ring thus formed has attained a diameter of about $\frac{1}{2}$ an inch, a brown patch is again seen to be forming at its centre; this in its turn also cracks the young epidermis over it, and a second ring is formed inside the first, which it follows in its extension. A third brown central patch is formed in the centre of the second circle, and behaves in exactly the same manner; and so on with a fourth, fifth and never-ending series of concentric rings. I have endeavoured to represent this diagramatically in Figs. V, VII, and VIII, contrasting it with tinea circinata and chloasma.

Fig. V, I, represents a section of the skin through a patch of chloasma; the corium and rete Malpighii are entire, the epidermis alone affected and broken up into a number of minute furfuraceous scales.

Fig. V, II, a section through a newly-formed patch of tinea imbricata; the corium is unaffected, but the rete Malpighii is removed over a small part on both sides of the central brown spot; the scales of the ring in the epidermis are curled back, and no fresh epidermis has as yet formed over the centre of the ring.

Fig. V, III, section through a patch of tinea imbricata, in which many rings have formed—the corium being entire, but the rete Malpighii and epidermis interrupted at many points.

Fig. V, IV, spot of tinea circinata just formed; the upper part of corium bulged from infiltration; rete Malpighii and epidermis scaling.

Fig. V, V, the same, the ring having opened the corium; rete Malpighii and epidermis entire, except at the section of the ring.

Figs. VII and VIII, ground-plan of tinea imbricata and tinea circinata, respectively.

There is a marked contrast between tinea circinata and tinea imbricata in the parts and extent of the skin they respectively attack. The former elects, in preference to any other locality, those parts of the body which are usually covered with hair, as the scalp, axilla and pubes; the latter, on the contrary, avoids these situations. The Chinese have very seldom a strong crop of hair on the front of the chest, on the small of the back, or legs and arms; yet these situations, so

frequently covered with hair in the European, are, strange to say, shunned by the fungus of tinea imbricata. If, however, tinea imbricata has spread on to a hairy part, the hair follicles are not invaded by the fungus, as in tinea circinata, and the hair continues firmly implanted, glossy and natural.

Again, tinea imbricata, if it has been in existence any length of time, involves a very large surface, as an entire limb, or side of the trunk, or oftener still, if not checked, nearly the whole surface of the body. Tinea circinata, though sometimes including in its rings large areas, yet, by its nature is hindered from attacking at one time the entire skin, as an interval must elapse before a second ring can follow the first. In point of fact, in tinea circinata, though there may be several rings in existence at one time, and some of them include a very large area, yet we seldom have to deal with surfaces more than six inches in diameter, usually with much smaller.

The disease advances over the skin at about the rate of $\frac{1}{4}$ of an inch weekly; this is about the rate of progress in tinea circinata also. As advancing rings spread, their regularity is modified by the shape of the parts, the nature of the skin they travel over, and by encountering other systems of rings. Thus, after a time, the plan is lost or obscured, while the pattern of the disease, so to speak, is everywhere preserved.

In fair-skinned races, chloasma, or pityriasis versicolor, shows as a brown or fawn-coloured patch on a light ground. In the dark-skinned races, on the contrary, it shows as a lighter coloured patch on a dark ground. In the yellow-skinned races, like the Chinese, in some the colour of the patch of disease and general complexion so nearly correspond that it is only by observing the scaliness and slight elevation of the part, and by the use of the miscroscope, that we can pronounce it chloasma. In coolies and those whose skin is darkened by exposure to the weather, the spot is always much paler than the healthy skin; in the pale sallow-faced shop-keeper, always darker than the healthy skin. A very large proportion of the natives of this district can show patches of chloasma, usually about the neck, chest or shoulders, or over the abdomen, just under the waist-belt. Every one is familiar with the mottled appearance the skin of coolies frequently presents. I have satisfied myself that this is chloasma, and is entirely owing to the microsporon furfur, which can be found in great abundance in any of these cases. The fungus I have contrasted with that from cases of chloasma brought from Europe and America, and find them to be identical. It is situated on the under surface of the outermost pellicle of epidermis, and the globular double-outlined conidia, arranged in clusters, and short much-jointed mycelium are quite characteristic. The colour of the chloasma spot is owing to the colour of the fungus, and not of the skin; and being the same or nearly the same in every case, it appears lighter than the skin in dark races, and ~~paler~~ darker than the skin in fair races.

Limited Geographical Area within which Tinea Imbricata Flourishes.

An additional argument for separating this disease from tinea circinata, and placing it as a species by itself, is supplied by the peculiarity of its geographical distribution. I have seen a great many cases in Amoy, but, with one exception, all of these have been at one time in the Straits of Malacca, or islands of the Malay Archipelago, and it was there the disease was acquired. I have seen cases in South Formosa also, but as I made no enquiries as to where their skin

affection was acquired, I cannot say whether it was indigenous or imported. For a considerable part of the year, the climate of South Formosa is very like that of the Straits. The instance I refer to as having arisen in Amoy, was in the person of the relative of a man who had returned from the Straits covered with the disease. Disregarding this case, it would appear that some peculiarity of climate is necessary for the ready spread of the disease from person to person, although when once established in the individual it flourishes in China as well as in its home, as proven by the results of inoculation. Possibly, in the warm, moist, equable climate of the Straits, there is developed some fungus element which will not grow in the colder, drier climate of China, and the spontaneous spread of the disease is affected by this.

I believe that tinea imbricata is the disease described as "Pita," or "Tokelau itch," in the *Scheme for obtaining a Better Knowledge of the Endemic Skin Diseases of India*, edited by Drs. Fox and Farquhar, and also alluded to by Dr. Thin in a late *Practitioner*. If it is identical with the Samoan disease, we know that it spreads rapidly enough under suitable circumstances. As far as I am aware, there is no other epiphytic skin disease, with the doubtful exception of the fungus foot of India, with so limited a geographical distribution.

Tinea Imbricata the Connecting Link between Chloasma and Tinea Circinata.

Assuming that I have proved the existence of a parasitic skin disease affecting the rete Malpighii, we have now, apart from those confined, or nearly so, to the hairy scalp, three well-marked epiphytic skin diseases, viz.:—tinea circinata, tinea imbricata, and chloasma, each affecting a different layer or element of the skin. Tinea circinata has its seat in or on the corium, or deep layer; tinea imbricata in the rete Malpighii, or middle layer; and chloasma in the epidermis, or surface; and to this selection or locality, rather than to any peculiarity in the habits of their respective fungi, seem to be due the characteristic clinical features of these different diseases. The epidermis, so abundantly and constantly reproduced, supplies a never-failing supply of pabulum for its fungus; so that, while spreading at the margin of the patch, there is no death of fungus or subsidence of the disease in the centre of the part affected, the disease relinquishing no place once attacked; hence its appearance in a circular patch, uniform in colour and texture throughout its extent. In tinea circinata on the contrary the fungus, living on some element of the more slowly reproduced corium, while spreading towards hitherto unexhausted, unaffected tissue, is compelled to relinquish what it has already passed over, dying for want of the suitable element; hence it assumes the form of a single ring. Tinea imbricata is the link both in position and appearance between these two, as the rete Malpighii occupies a place intermediate in position and facility of production between corium and epidermis. The pigment layer is not so easily or rapidly formed as is the epidermis; hence the fungus cannot be universally distributed as a patch over the affected part; but the tissue being more easily and quickly reformed than the corium, the fungus element has the opportunity of starting afresh before from lapse of time or want of food it has completely died out; thus its successive generations advance in succeeding rings.

I am aware that many dermatologists favour the view that the various skin fungi are but modifications of either penicillium or aspergillus, and of each other, and that the same fungus

will give rise to favus, chloasma or tinea circinata according to circumstances. I cannot agree with this opinion. If it is correct, how comes it that in the same man I can by inoculation, as often as I wish produce on one arm tinea circinata from a case of tinea circinata, and at the same time, on the other arm tinea imbricata by inoculating from tinea imbricata; but never tinea circinata from tinea imbricata, or *vice versâ?* The diseases at any rate, whatever may be the nature of their exciting fungi, possess the most essential quality of distinct species—they breed true.